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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,537	07/25/2003	Gary L. Sugar	Cognio29US	3568
24374	7590	04/06/2006	EXAMINER	
VOLPE AND KOENIG, P.C. DEPT. ICC UNITED PLAZA, SUITE 1600 30 SOUTH 17TH STREET PHILADELPHIA, PA 19103			NGUYEN, SIMON	
			ART UNIT	PAPER NUMBER
			2618	
				DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/627,537	SUGAR ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	SIMON D. NGUYEN	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 03 February 2006.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-4,6-15 and 17-25 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-4,6-15 and 17-25 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 25 July 2003 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-4, 10-15, 21-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Medvedev et al. (US 2005/0094598 A1).

Regarding claim 1, Medvedev discloses a method of simultaneously transmitting signal over a channel between a first device and a second device in a MIMO system (fig.3), comprising: processing a vector  $s$  representing signals (paragraph 43) with a transmit matrix that is computed to maximize capacity of the channel by multiplying the vector with the transmit matrix (paragraph 43), wherein the transmit matrix is equal to an eigenvector matrix for  $H^H H$  (paragraph 41), wherein  $H$  is the channel response from the first device to the second device (par. 42), diagonal matrix  $D$  (par. 38-43) in the transmit power  $p$  from the first signal  $S_1$  to  $S_n$  (paragraphs 59-60, 65, 67-77) (paragraphs 21-31, 36-43).

Regarding claim 12, this claim is rejected for the same reason as set forth in claim 1.

Regarding claim 22, this claim is rejected for the same reason as set forth in claim 1, wherein the first device comprising a plurality of transmitter, each coupled to the corresponding antenna, a processor for processing transmitting signals, and the second device comprising a plurality of receivers, each coupled to a corresponding one of the plurality of antenna and a baseband signal processor for weighting and combining in order to recover the received signals (figs.3, paragraphs 45-47, 137-139)

Regarding claims 2-4, 13-15, 23-25, Medvedev further discloses the transmit matrix is computed based on a power constraint (paragraphs 31, 122), wherein the power between the antennas are different (paragraphs 8, 11, 80-83, 112), or the same power for all antennas (transmit power uniformly to all transmit antenna) (paragraph 75).

Regarding claim 10, Medvedev discloses M antenna (Nr) for receiver (fig.3), wherein the signals received at the M antennas are processed by weighted and combined to recover the signals (fig.3, paragraphs 45-47, 137-139).

Regarding claim 11, 21, Medvedev further discloses a multi-carrier modulation process (fig. 3, paragraphs 21-43, 65, 134-136).

3. Claims 1, 12, 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Walton et al. (2003/0125040).

Regarding claims 1, 12, 22, Walton discloses a method of simultaneously transmitting signal over a channel between a first device and a second device in a MIMO system (fig.2a-b, paragraphs 41, 72), wherein the first device comprising a plurality of transmitter, each coupled to the corresponding antenna, a processor for

processing transmitting signals, and the second device comprising a plurality of receivers, each coupled to a corresponding one of the plurality of antenna and a baseband signal processor for weighting and combining in order to recover the received signals (figs.2-4), the method comprising: processing a vector  $s$  representing signals with a transmit matrix that is computed to maximize capacity of the channel by multiplying the vector with the transmit matrix, wherein the transmit matrix is equal to an eigenvector matrix for  $H^H H$ , wherein  $H$  is the channel response from the first device to the second device, diagonal matrix  $D$  in the transmit power  $p$  from the first signal  $S_1$  to  $S_n$  (paragraphs 78, 79, 106-108, 117-124), wherein Walton further discloses the power constraint for transmitting antenna either the power for each antenna is different or the power is equal to all antennas (paragraphs 228, 258, 336, 459).

4. Claims 1, 12, 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Hochwald et al. (6,058,105).

Regarding claims 1, 12, 22, Hochwald discloses a method of simultaneously transmitting signal over a channel between a first device and a second device in a MIMO system (abstract, figs. 3, 4, 6) wherein the first device comprising a plurality of transmitter, each coupled to the corresponding antenna, a processor for processing transmitting signals, and the second device comprising a plurality of receivers, each coupled to a corresponding one of the plurality of antenna and a baseband signal processor for weighting and combining in order to recover the received signals (figs.3,4), the method comprising: processing a vector  $s$  representing signals with a

transmit matrix that is computed to maximize capacity of the channel by multiplying the vector with the transmit matrix, wherein the transmit matrix is equal to an eigenvector matrix for  $H^H H$ , wherein  $H$  is the channel response from the first device to the second device, diagonal matrix  $D$  in the transmit power  $p$  from the first signal  $S_1$  to  $S_n$  (column 3 line 44 to column 5 line 41, column 7 lines 1-35, column 9 lines 4-39).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6-9, 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Medvedev et al. (2005/0094598) in view of Benesty et al. (2004/0013212).

Regarding claims 6-9, 17-20, Medvedev discloses that the power transmitted by each of the  $N$  antennas is the same and equal when  $N_t$  (# antennas in a transmitter) =  $N_r$  (# antennas in a receiver)(paragraphs 37-41, 54, 67-69). It should be noted that Medvedev discloses the transmission power in a MIMO is emitted either different or equal for antennas which is obviously to teach as claimed in claims 6-8).

Benesty discloses the processing of multiply the vector with the transmit matrix for a plurality of antennas for each condition when  $N \neq$ , greater or smaller  $M$  (see previous Office Action) (paragraphs 26-34, 100, 115). Therefore, it would have been

obvious to one skilled in the art at the time the invention was made to have Medvedev, modified by Benesty in order to optimize the system power performance.

***Response to Arguments***

7. Applicant's arguments with respect to independent claims 1, 12, 22, the cited references issued to Medvedev et al., Walton, and Hochwalk, each discloses the step of processing the transmit signal with the transmit matrix by multiplying the vector signals with the transmit matrix in a MIMO system. Even though the letter symbols used in the specification of the references may be different with the letter symbols in the claims of the application (for example, the symbol V in the formula is represented for the eigenvector matrix, but this symbol does not use in the reference of Medvedev), however, the concept for processing or the computation is almost the same.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Simon Nguyen whose telephone number is (571) 272-7894. The examiner can normally be reached on Monday-Friday from 7:00 AM to 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban, can be reached on (571) 272-7899.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 306-0377.

Art Unit: 2618

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

600 Dulany, Alexandria, VA 22314

Or faxed to:

(571) 273-8300 (for formal communications intended for entry)

Hand-delivered response should be brought to Customer Service Window located at the Randolph Building, 401 Dulany, Alexandria, VA, 22314.

Simon Nguyen

March 31, 2006

  
SIMON NGUYEN  
PRIMARY EXAMINER